NOAA FISHERIES

Ocean Acidification

Using a state-of-the-art experimental facility, the NWFSC is leading efforts to understand the biological and ecological impacts of ocean acidification throughout the West Coast.

Ocean acidification may be considered one of the biggest oceanographic challenges in the coming century and has emerged as a research priority at NOAA. Northwest Fisheries Science Center (NWFSC) scientists are playing a critical role in helping the agency advance the science and manage the consequences of ocean acidification on our nation's living marine resources.

What is Ocean Acidification?

Ocean acidification is primarily caused by human-derived increases in atmospheric carbon dioxide (i.e., burning of fossil fuels) that is then absorbed by the ocean, leading to chemical changes that make the ocean more acidic.

Increases in ocean acidity can make it harder for many marine creatures to develop normally and survive, because ocean acidification disrupts the calcification process of shell-producing organisms --particularly krill, oysters, sea urchins and corals. These changes can lead to a ripple of effects up the marine food chain to other species of commercial and conservation concern.

Puget Sound at Risk

Marine waters along the Pacific Northwest coast are naturally more acidic than those of other regions, making this region more vulnerable to the effects of acidification. Many species of regional economic importance, such as oysters and crabs, as well as primary producers such as phytoplankton, are likely to experience direct effects from ocean acidification.

Ocean acidification will result in species that are "winners" as well as "losers". For example, wild Pacific oysters show strong sensitivity to ocean acidity, as seen in the recent failures of oyster reproduction in Willapa Bay. While shellfish struggle, some plants, like eelgrass, appear to grow better in a carbon-dioxide rich environment.

Economically, ocean acidification poses a threat to the health and prosperity of the $100 million a year shellfish industry, with additional indirect losses to the finfish industry because of declines in fish prey species.

Highlights of NWFSC Research

Species response experiments

The NWFSC has built an experimental state-of-the-art facility for growing animals in conditions that mimic pre-industrial, current, and future ocean carbon dioxide levels to observe changes in animal growth, survival and behavior. To more closely mimic conditions that marine organisms experience in the ocean, scientists use the ocean acidification facility to reproduce the natural changes that occur in carbon dioxide levels, temperature, and oxygen concentrations at daily, weekly and seasonal scales. Scientists are currently studying the biological effects of ocean acidification on larval geoduck, Pacific oyster, Olympia oyster, pinto abalone, krill and copepods (zooplankton that are food for the fish we eat), Dungeness crabs, herring and rockfish.

Ecosystem modeling

Scientists are using ecosystem models to identify how changes in the parts of the food web that are considered to be directly vulnerable to acidification will affect the entire food web in Puget Sound, including how changes in prey species will affect harvested fish, threatened species, and other valuable marine resources.

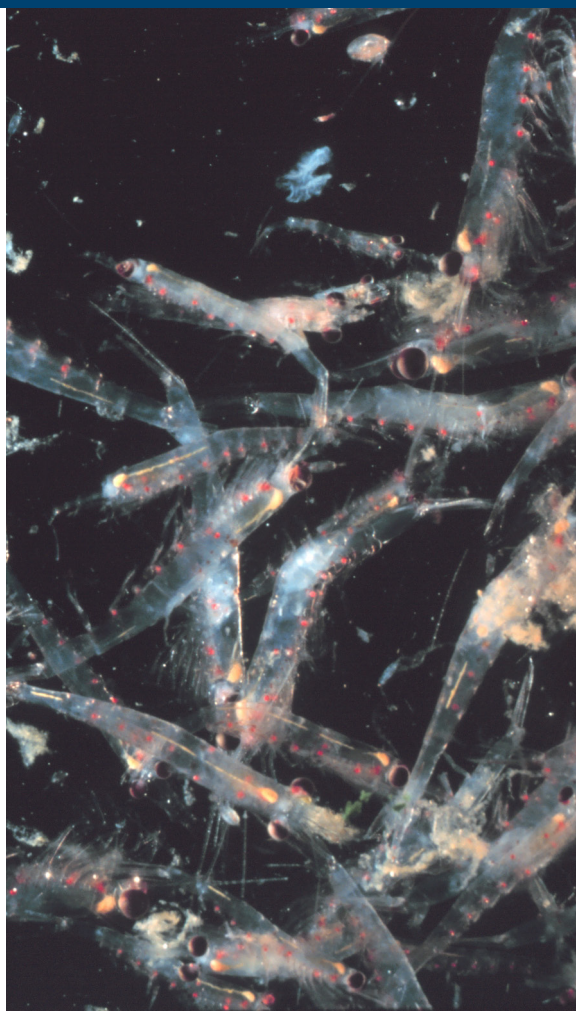
Field measurements

NWFSC researchers are making precise measurements of ocean acidity as part of sampling zooplankton and fish to understand the relationship between carbon dioxide and key species in Puget Sound.

Outreach and Education

The NWFSC is collaborating with the Pacific Science Center, the Seattle Aquarium, the University of Washington and other organizations to increase public awareness of the impacts of ocean acidification. Scientists conduct community outreach through public lectures, tours, and exhibits, and have also helped develop hands-on educational resources.

Ocean acidification facility



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